Menlo Park Notebook #13 [N-79-01-01]

This notebook covers the period January-July 1879. Most of the entries are by Charles Batchelor. There are also entries by Edison, Francis Upton, and John Kruesi. Many entries are signed by Edison. Almost all of the material relates to experiments on electric lighting. Included are a caveat by Edison on generators; notes, drawings, and calculations about generators; and drawings of lamps. There are also drawings of telephones, notes by Batchelor on the design of a building to house an engine, and a note by Kruesi on a water tank. The label on the front cover is marked "Edison's First Magneto." The book contains 232 numbered pages followed by 2 unnumbered pages.

Blank pages not filmed: 6-7, 10-11, 130-131, 188-189, 198-199.

1110 13.

LIBRARY OF THE

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120 BROADWAY, NEW YORK.

_____, 189 .

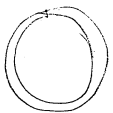
1013 4 in 3. ft ft long
½ inch thick

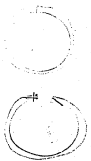
37 19

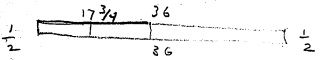
137

1
1
2

4135
9.







3

3 feet $\frac{1}{2}$

37 ~~feet~~ inches

2

73

2

3 | 71

35

72

1

73

2 | 36.5

18.25

5-0

2 | 17.75

17.75

50

17.25

$\frac{1}{15}$

$AB + BE = \frac{1}{2}(AB + BC) -$

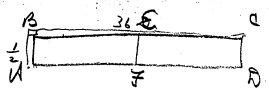
16 × 9 = 144 + 72 = 432

16 × 9.2 = 152 + 7 = 1.3.1.0

3 × 3.42 = 10.26

34.2

54.72



$AB + BC$

~~$AB + BE = \frac{1}{2} AC$~~

$AB + BE = \frac{1}{2}(AB + BC)$

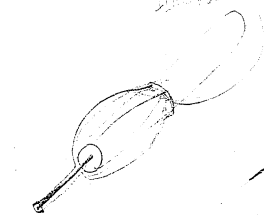
$BE = \frac{1}{2}(BC - AB)$

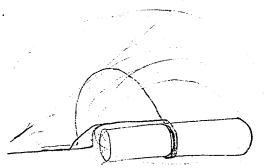
4.062 × 5 = 35.56 ÷ 2 = 17.78

36.5 × 5 = 35.5 ÷ 2 = 17.75 × 5 = 17.25 ÷ 2 = 8.625 × 5 = 8.125 ÷ 2 = 4.062

8

Jany 1 1879
TAE





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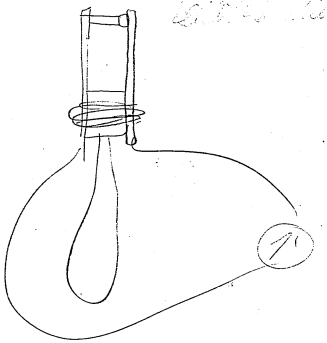

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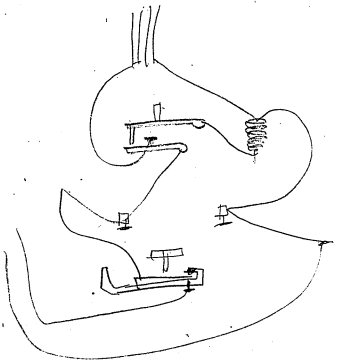
13

January 1 1879 T & E

Winchester



14

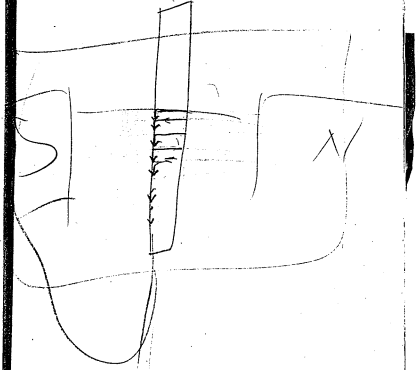
Northland

Northland

Northland

15

Jany 1/79
-TAE



January 1 1879

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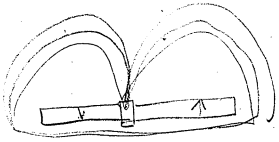

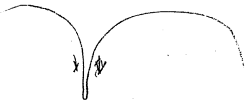

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January 1 1879
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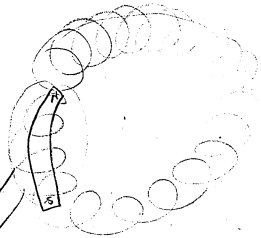
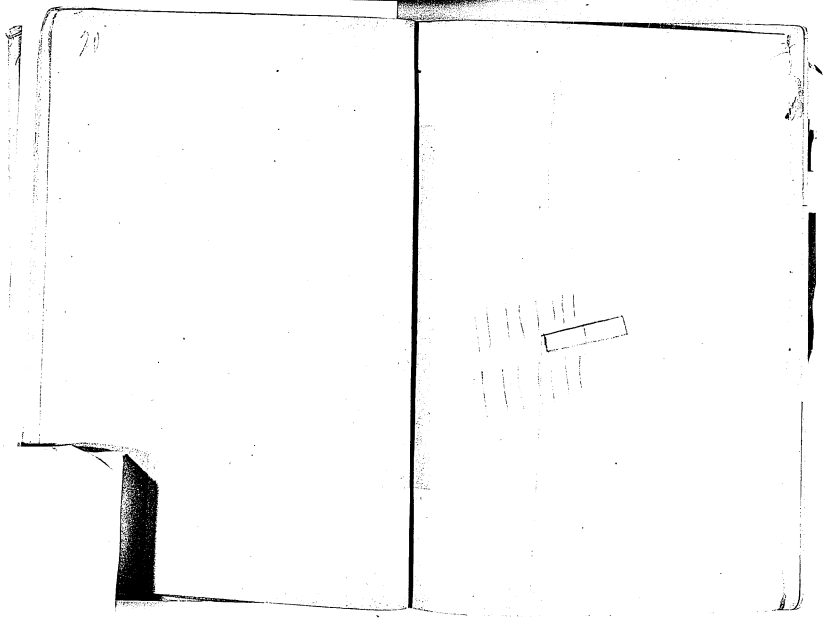
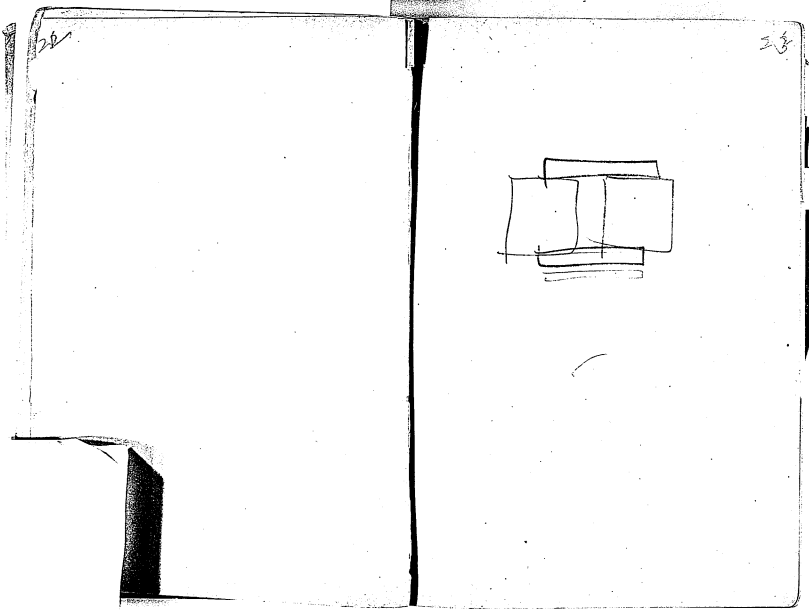






Notes on the making of Jan 1st 1893
Edison's New Magnetic Electric Chemical Tattler
Generator

TAE

/ Commutator :-

Must be finely divided 3/4 of an inch 4 to an inch

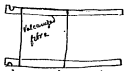
Must be fixed with double commutator
Springs so that one pair can be lifted
and that part cleaned without stopping

Must be fixed so that the dirt will drop through

Must be about 3 inch long -

Commutator and brushes must be
made of the metal that will give the
least arc when in circuit with
a battery of 8 or 10 carbon cells and
a large coarse wire magnet

Commutators must be made of
metal drawn in shape and each length
has a groove in end to hook
the bared wire on;
these are drawn into a



disc piece of vulcanized fibre, turned off and
the wire soldered to the metal

7/8 26 wire

Diameter of wire .018 inch

1000 feet = .980 lbs

1 Ohm = 31.3 feet

Number of turns per inch 56

Length of 1 turn 43 inches

Number of layers 4

Total number of turns 224

Total length 802 feet

= Each coil = 56 turns × 26 ohms = 224 turns

4 layers

Inch wide

Straw

.018
.018
144
64
224
43
172
86
802
313/802
51
26
182
156
26
.980
3
2940
49
2940

January 1 1879

Tae

16
2
2
16

21
21
645/8
5260

26.

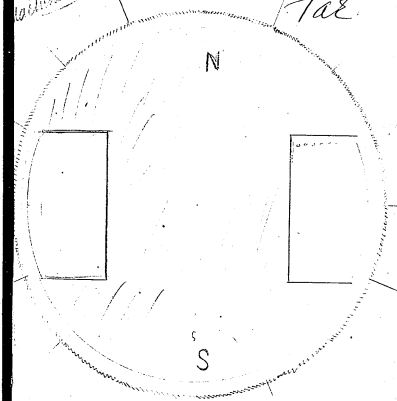
Jan 3 1878

New Machine Jan 3 1878 39
Chas Sawtell
Tax.

Ring to be wound
with 26 wire, each spool
1 inch long + 4 layers
which will give 645 feet
of ~~#40~~ 21 wire to each
spool = 4 spools in circuit
at once =
Total number of coils
160 ohms and contain
5·19 lbs wire

30

Jan 8 1779 31



Mr. Jack Mechanic Jan 3 1879 33

Illustration

As shown on page ahead
there will be only 6 coils
in position marked 7
this will give joint resistance
of 3½ ohms
Armature must be 4 ohms
to do this we must use
600 turns of No 16 wire
give 4 9/10 ohms

Sectional Area Round wire $\frac{\pi}{4}$ sq in
armature wire = $2 \times .78 = 2.24$

each turn is 4 inches

16 wire 407 ft 1 ohm it would have to be 1628 feet long this would have to be coiled only 480 times it would however coil about 610

12 wire 1160 feet 1 ohm it would have to be 4600 feet long this would have to be coiled 115 times

14 wire 660 ft 1 ohm it would have to be 2640 feet long coiled in 40 inch

16 wire 170 feet 1 ohm it would have to be 680 feet long coiled in 40 inch

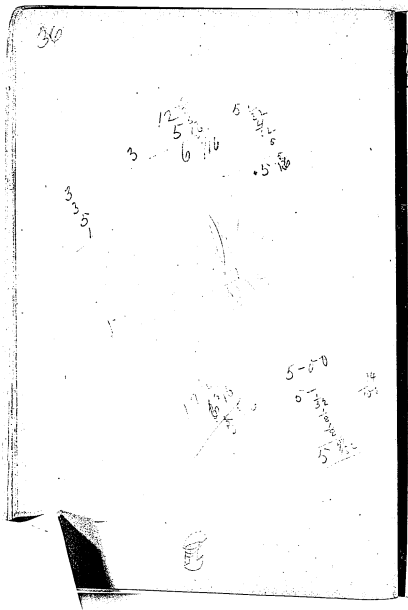
15 wire 501 feet = 1 ohm

2004 feet = 4 ohms

should fill in 600

15 wire 560 turns will fill $3\frac{1}{10}$ ohms

16 wire 600 turns will fill $4\frac{9}{10}$ ohms



Vapor Machine Jan 3 1927
Chas. E. Eckels

Finally
the Armature must be
5" diameter iron
Air space 1/32
Shell 1/16
Wire space 7/100
outside cast iron rings 3 3/32
Making 12.5 inches in toto

See further

38

1000

166 2/3

12 | 24 | 12
12 | 12 | 6 = 72

12 | 24 | 12 | 12 | 6

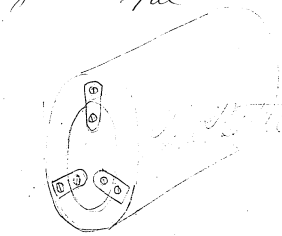
166 2/3

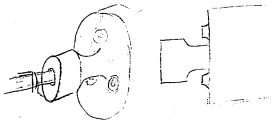
37 1/2

37 1/2

37 1/2

January 3 1879
TAE

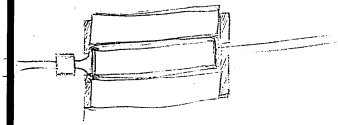




Edwards
Mag. Box Machine

Jan 4th 1870
Chas Batchelder

Make pieces on ends to cut the ends of box by ends of wires as in—



$2.50 = \frac{300}{4} = 9^{0}$

$\frac{300}{2} = 150$

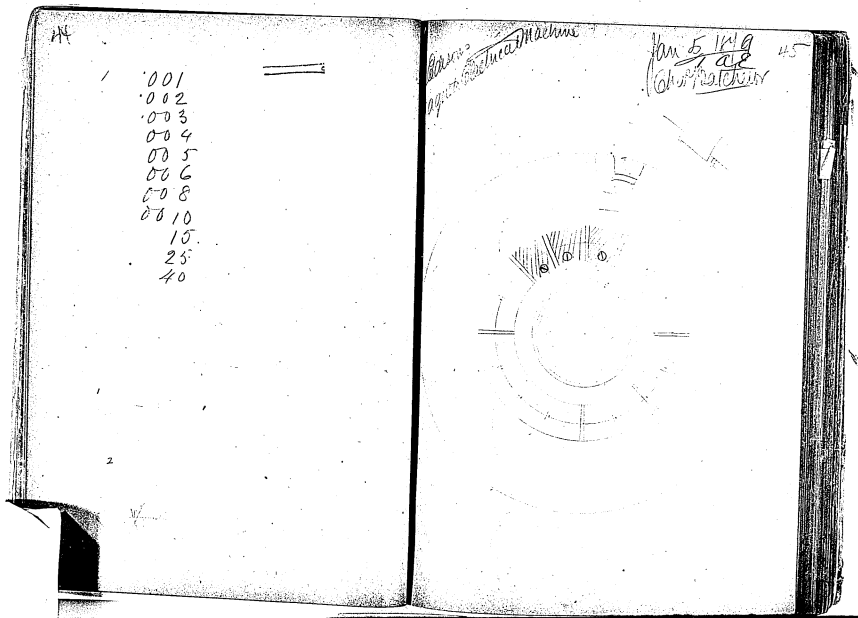
$\frac{75}{19}$ $\frac{75}{3}$ $\frac{3}{16}$

$.250 = \frac{1}{4}$

$\frac{1}{64}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

4 4

1 1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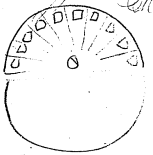
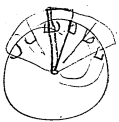
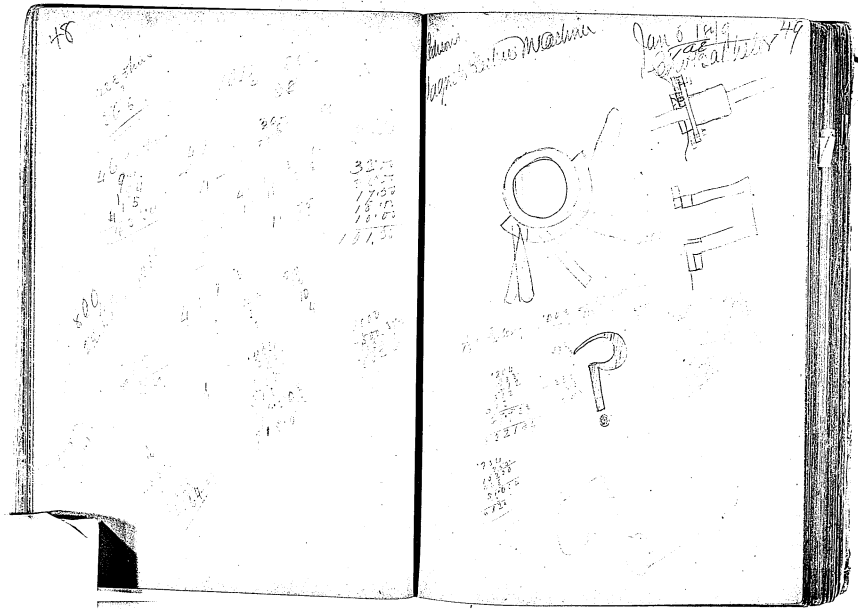
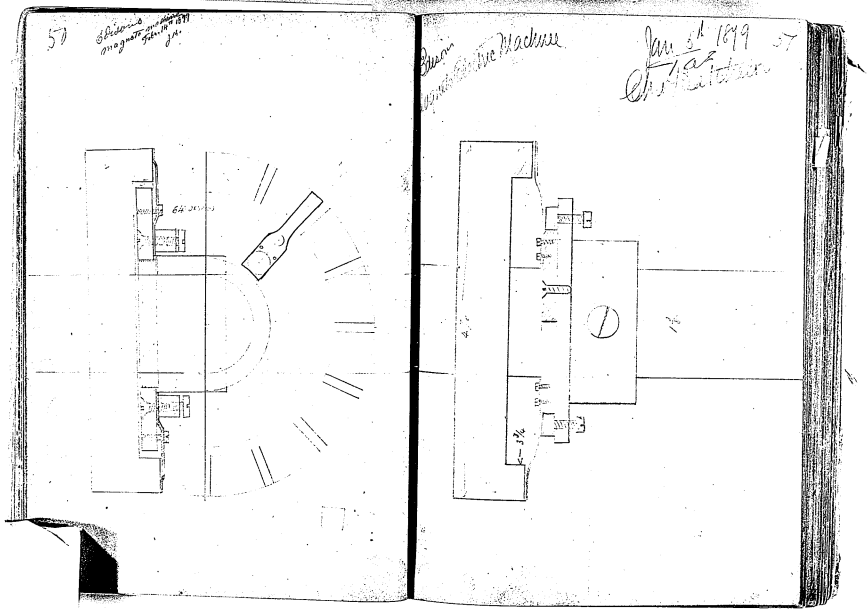
January 5th 1879

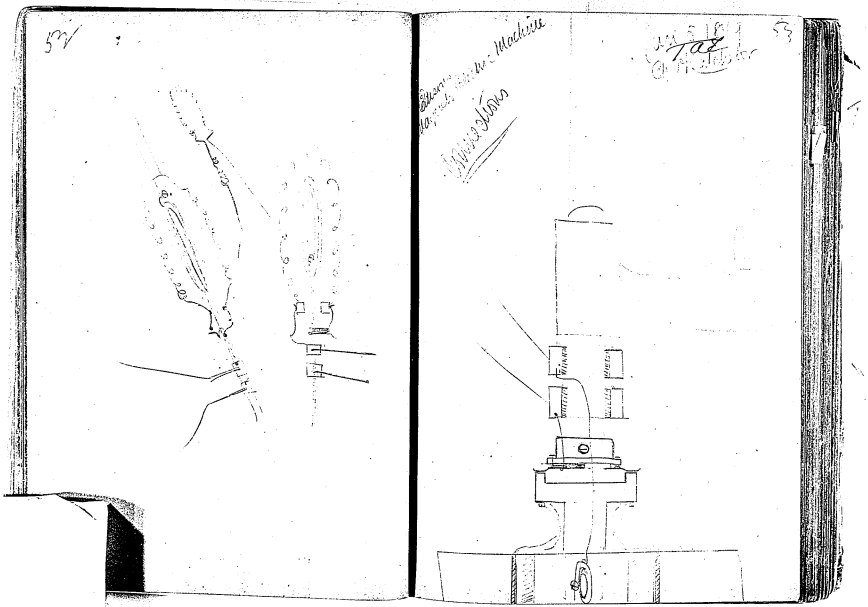
TAE





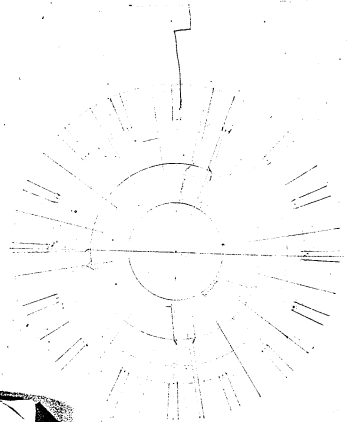


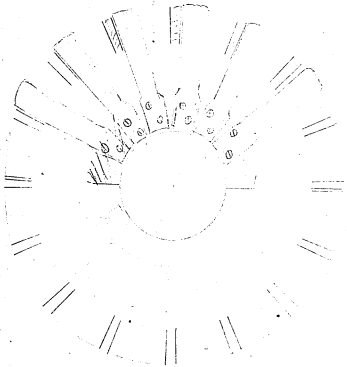




Edison's Magnetic Telephone Mach

June 6 1879
Edward Postlethwaite

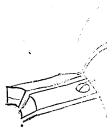


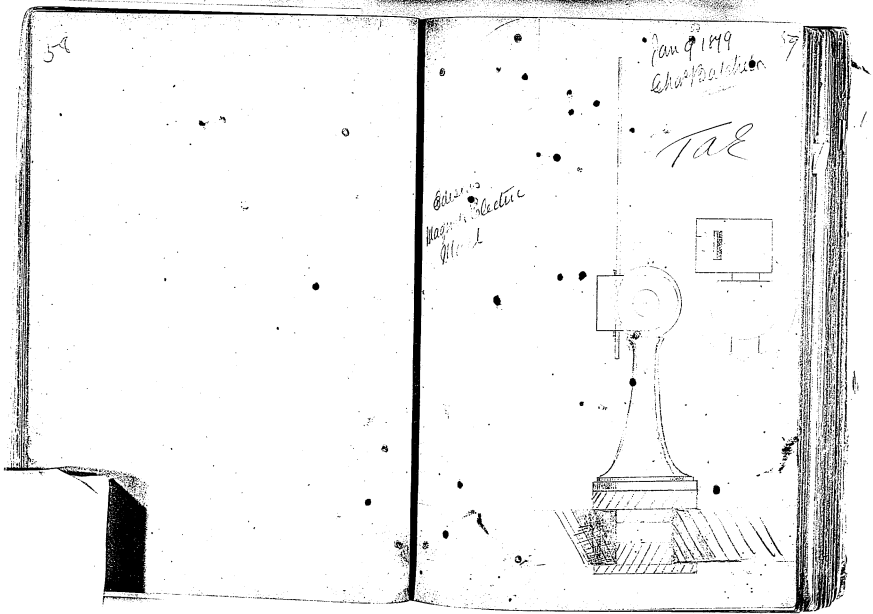


Jan 6th 1874 Tate

Have Orders 6th 26 Sail

And 25th & 16 Cots




58
Jan 9 1849
Chas Backus
TAE
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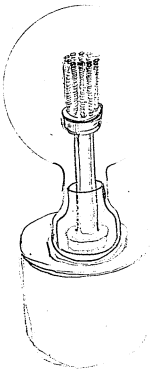
60

61

January 6th 1879



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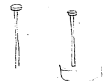

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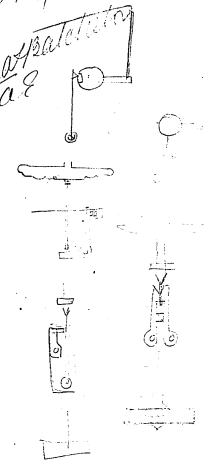
Jany 6 1879

* Chronometer
Tate



January 6
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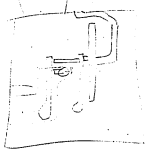

January 6 1879

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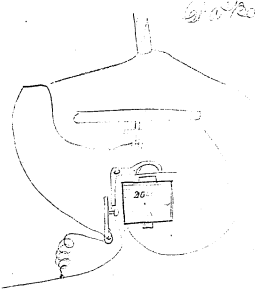

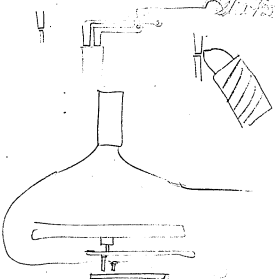

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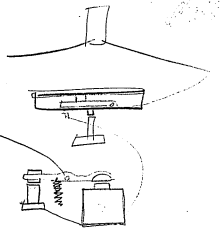
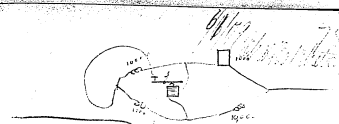
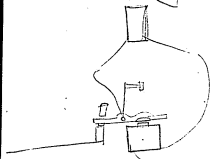


January 6 1879 10 T&E





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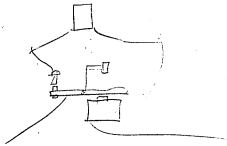
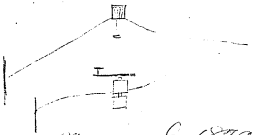
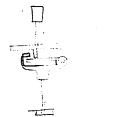
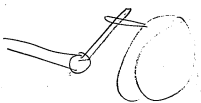
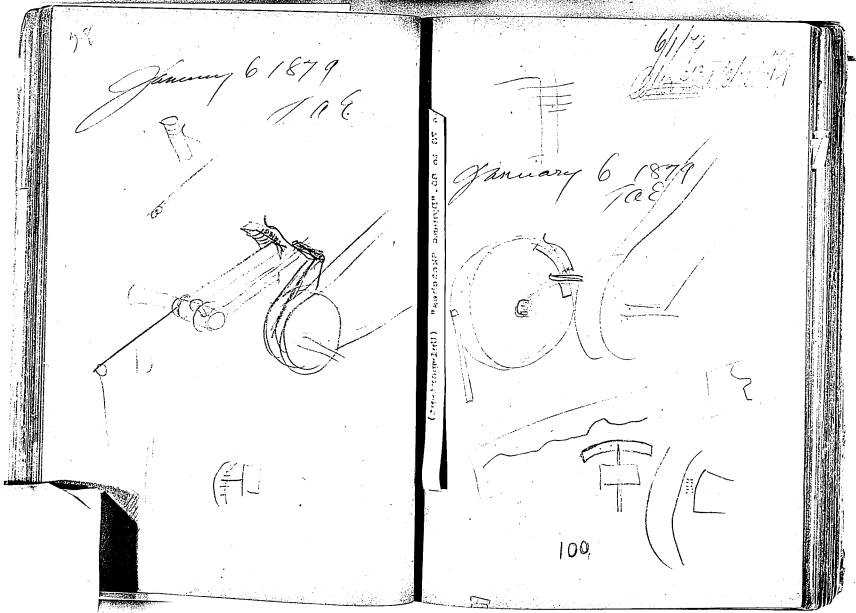




January 6 1879 Tat






January 6 1879
January 6 1879
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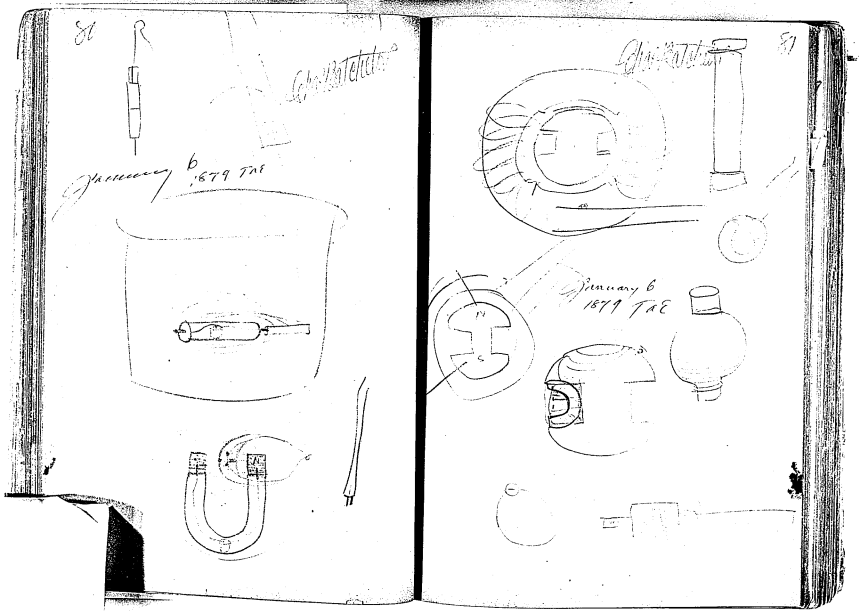
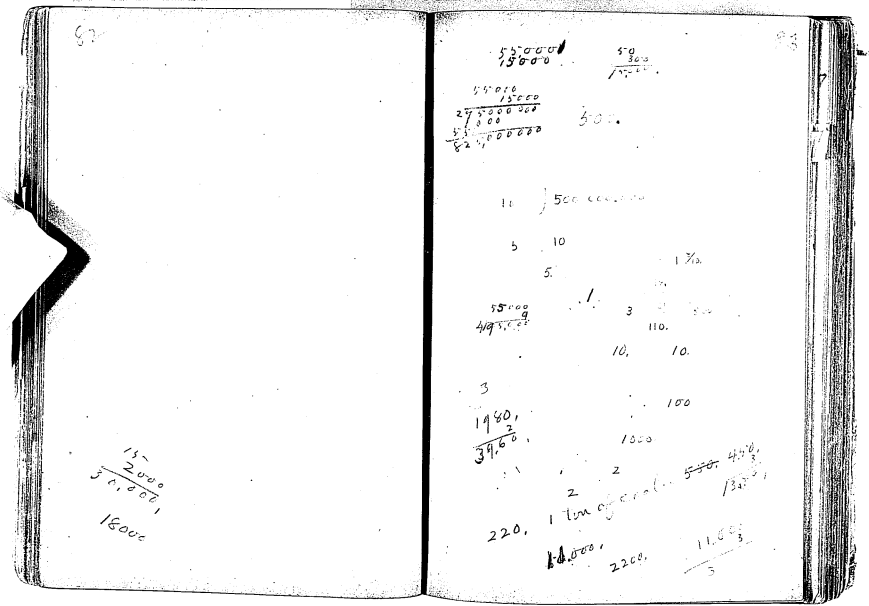
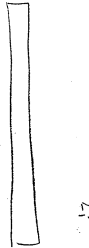

January 6, 1879 TAE
January 6 1879 TAE



84

group 6
1879 Ties



25 9 in.
25 17 D. "
25
194

9-9
34

1/8 X 3 X 5

Partition for Closet in top floor

Partition for bottom floor.

Height

Size of Glass January 6

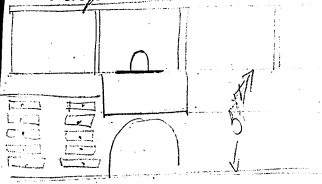
Height of woodwork 1879

Style of woodwork

Length of partition Tat

Door in partition

Ridgeboard



15 Windows
2 Doors
142 Sliding feet
Walnut panels and wood

1855

Partition for Closet
Ash + Walnut
Paneled
Outside partition + door Ash +
Walnut. Inside panels Pine
With ground Glass

January 6 1879 Taft

must be cut 15.7 when cold

15.7 = when hot = ~~15.897~~ 15.944

5 : 8

5.0625 5.1

.0625 .0156 1.5625 15.625 15

15.7

.0156 .0156 .0156 .0156

15.7 15.7 15.7 15.7

Shell — June 6 1879

Annature 5. in Face

Airspace 1/32 = 5 1/16 inside

Shell 1/16 = 5 3/16 outside

.5 1/16

.5 3/16

Mc Hill must be

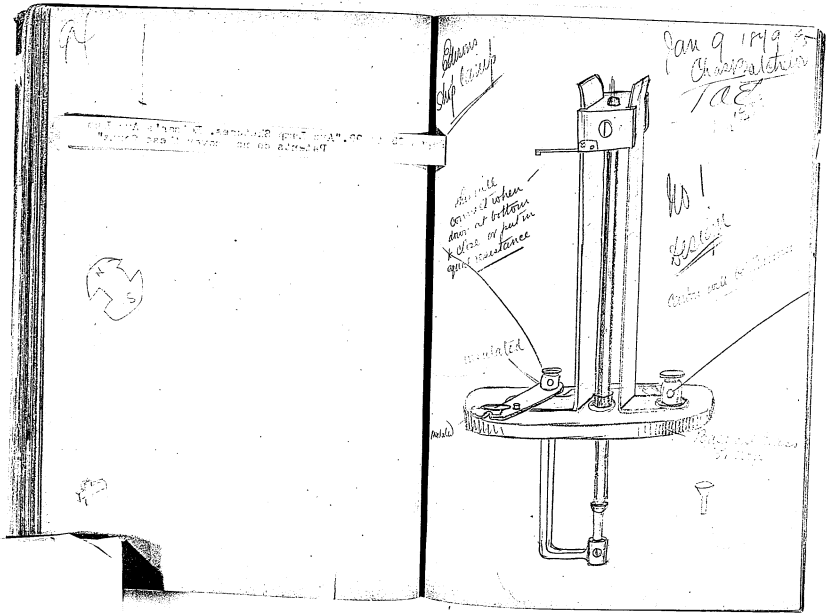
9

b outside 3.4

Shell for Edisons Magnet Machine

Made in centric of 3 pieces when put together [illegible] shell and the shell [illegible] rivet together and then shrunk on mandrel & [illegible]

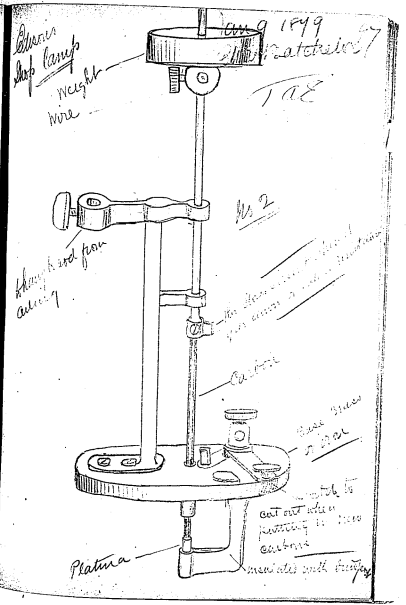
January 6 1879
TAE



Aug 9 1849

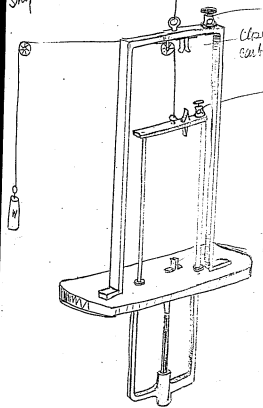
Catcheside

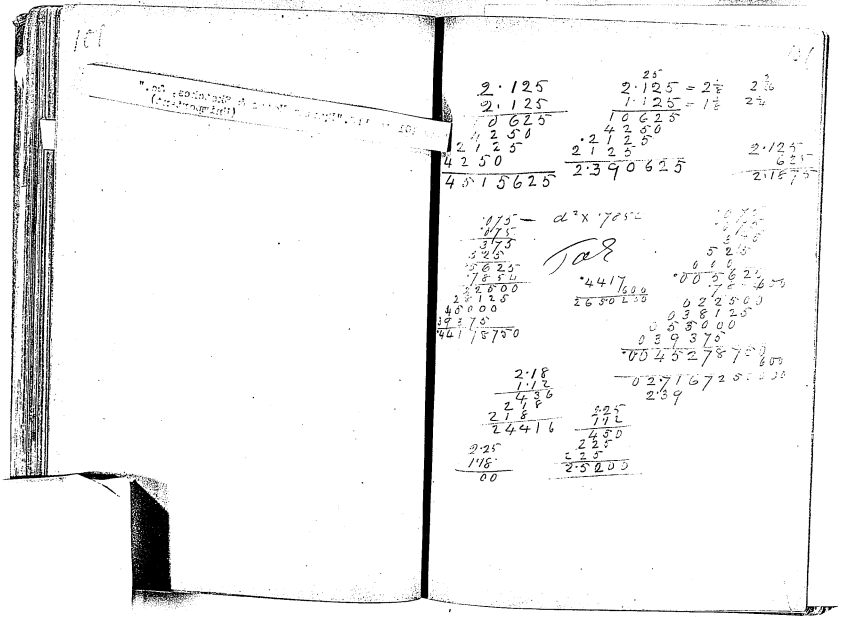
TAB

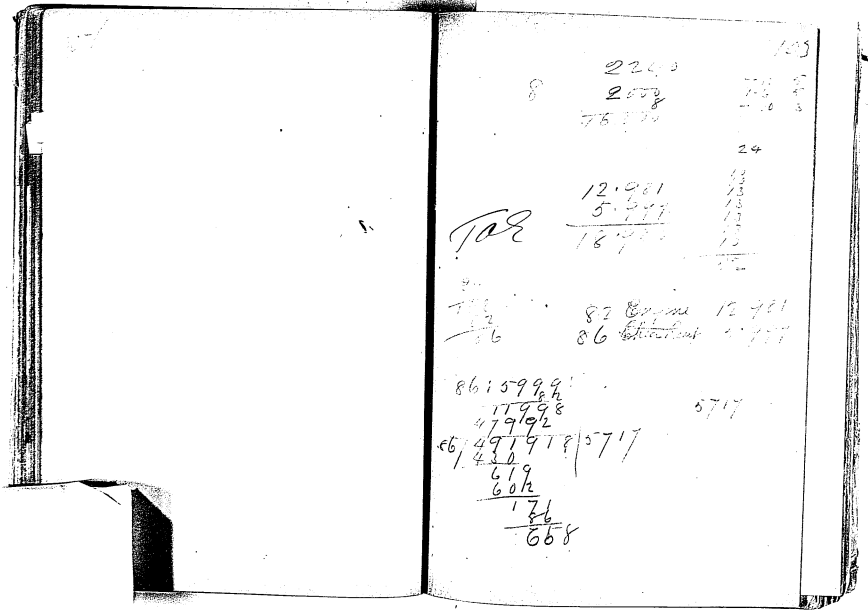


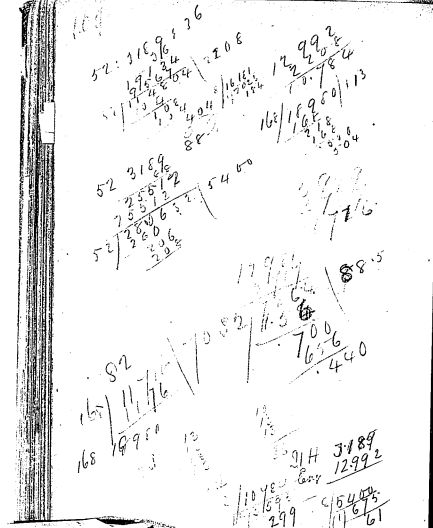
Electric Shelf Clamp

Jan 9 1899









Week Jan 10 & Jan 17

Engine running + Steam heat 12,981

Steam heating 86 = 5,999

Steam heating 86 + 82 = 5,999 + 5,717 = 11,716 lbs

Engine 82 hours

12,981 − 5,717 = 7264 lbs =

88.5 lbs per hour - Tar

Steam heating =

86 + 82 = 168 = 70 lbs per hour

Jan 3 — 10 1919

Engine Runn + Steam heating, 82 hours =

161 lbs coal

Engine 36 = 12,992

Steam H. 82 = 31,89

161,89

Steam H — 88 = 5400 61 lbs per hour

Engine = 36 - 10784 = 299 lbs per hour

Jan. 20th 1894

J.M.

T.A.E.

Water Tank Calculations

Space Standard Wheel Chair = 5'-6" x 2'-6" = 13.75 sq ft

Weight of Water = 5946.875 lbs

Normal Tank — 44'-6" x 4'-0" x 4'-0"

Weight — 44'-8" x 4'-0" x 4'-0" x 62.5 lbs = 44800 lbs

Capacity Gross 1043.5 Cu ft

Weight 10465.5 Cu ft x 62.5 lbs = 654093.75 lbs

Inside Surface of Tank 181.04 Sq ft

Steel Lining 4 Coats 724.16 Sq ft

at 8 ¢ per Sq ft $57.93

Labor for Tank $10.00

$67.93

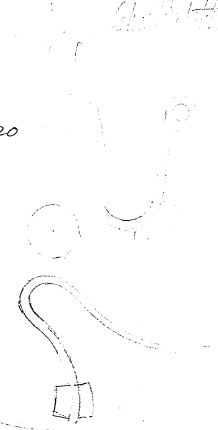
10th Lo outside 3.4
inside 8.4
11.8

From outside wires
to inside 6.8

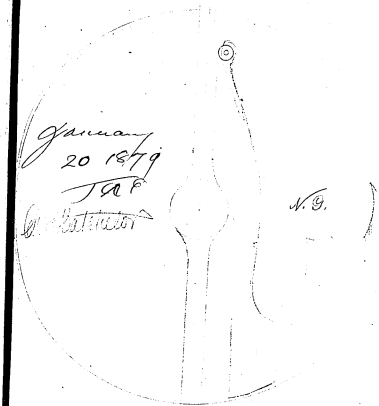
8.5

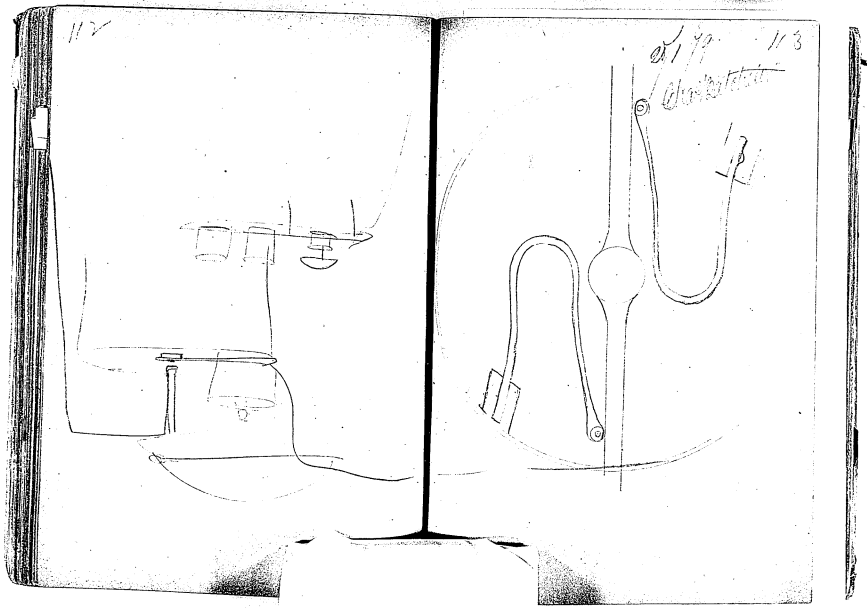
to the inside 2.3

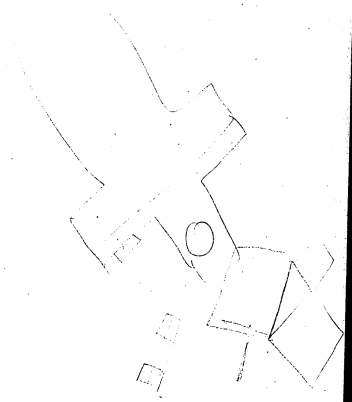
Gramm 20
879
Jag



January
20 1879
JAF
Illustration

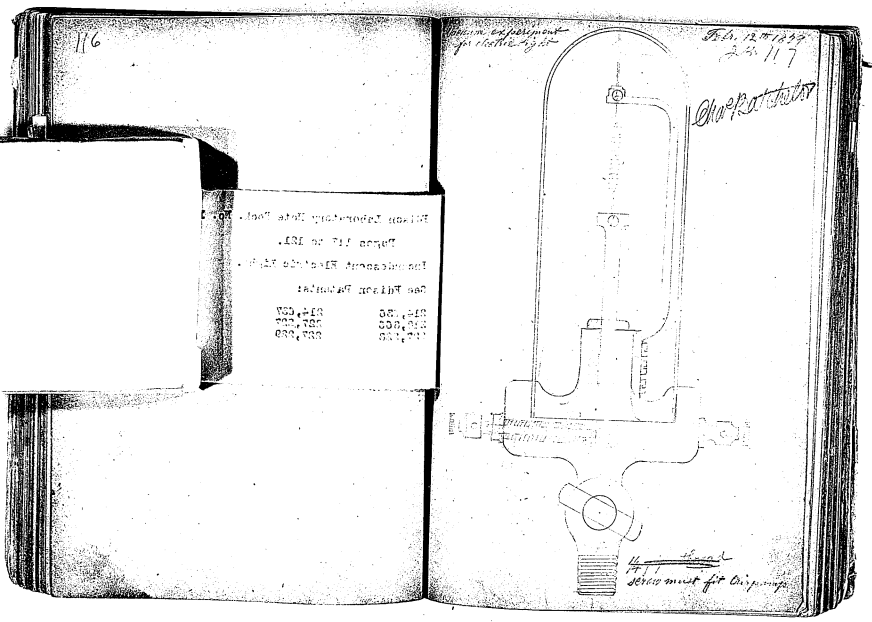


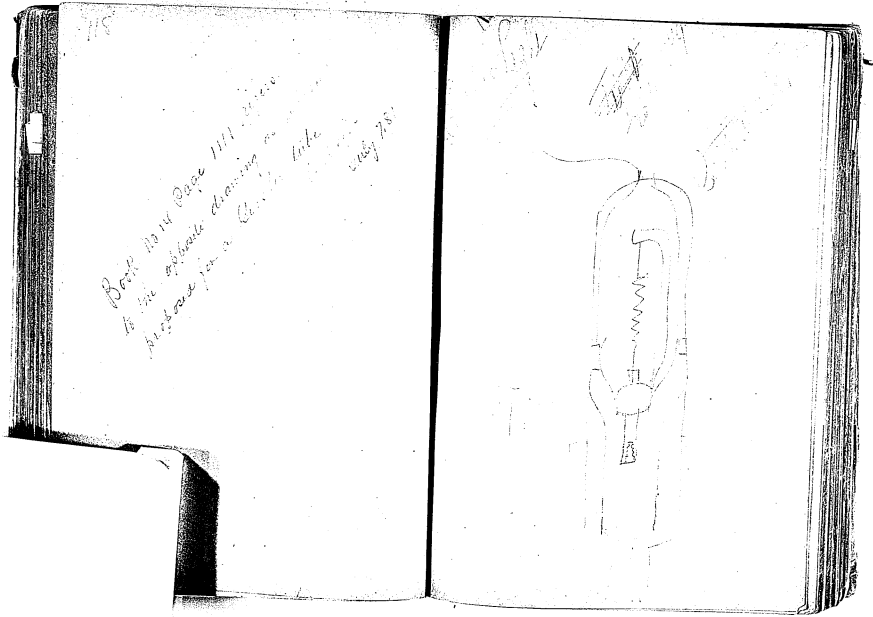


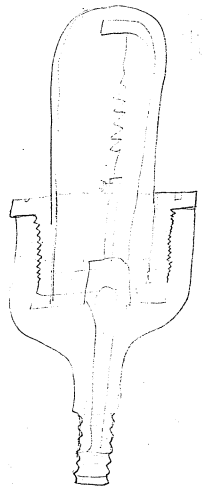


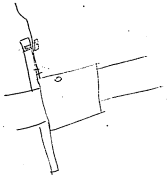
Weight of wire on armature for Dynamo Electric Machine 9 lbs 14 oz

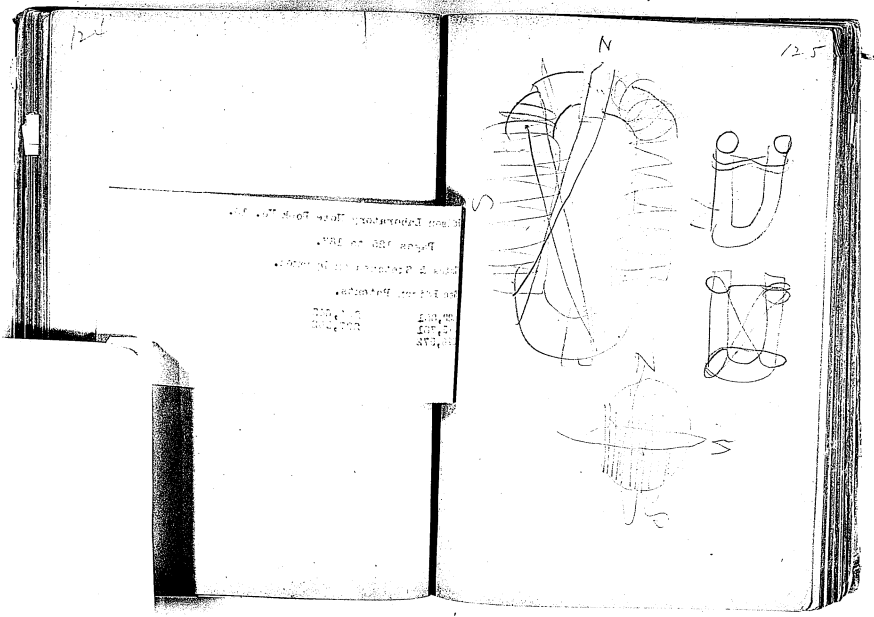
Weight of armature shaft & pulley Standard on 51 lbs.

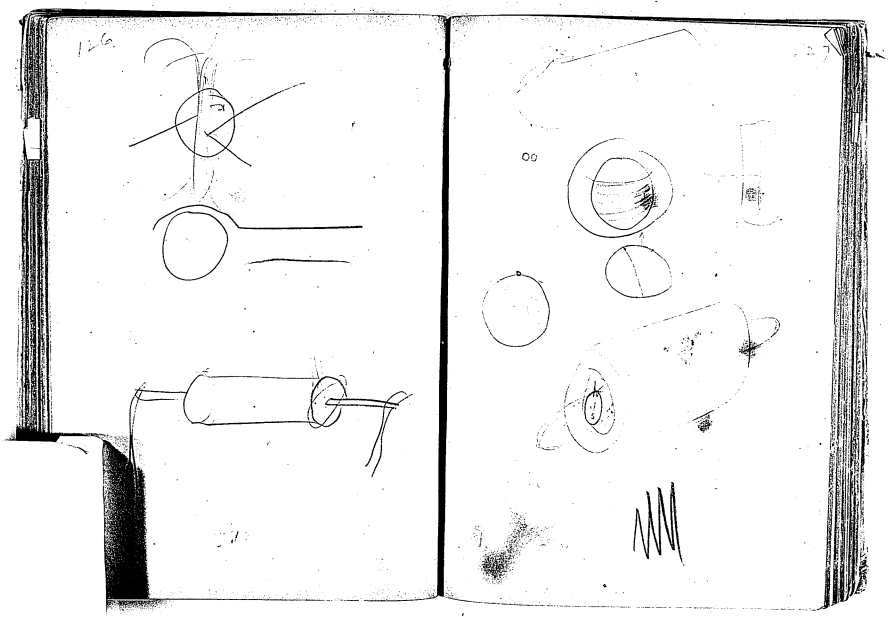

116
Feb. 12th 1929
2,701,117
Inventor
Witness

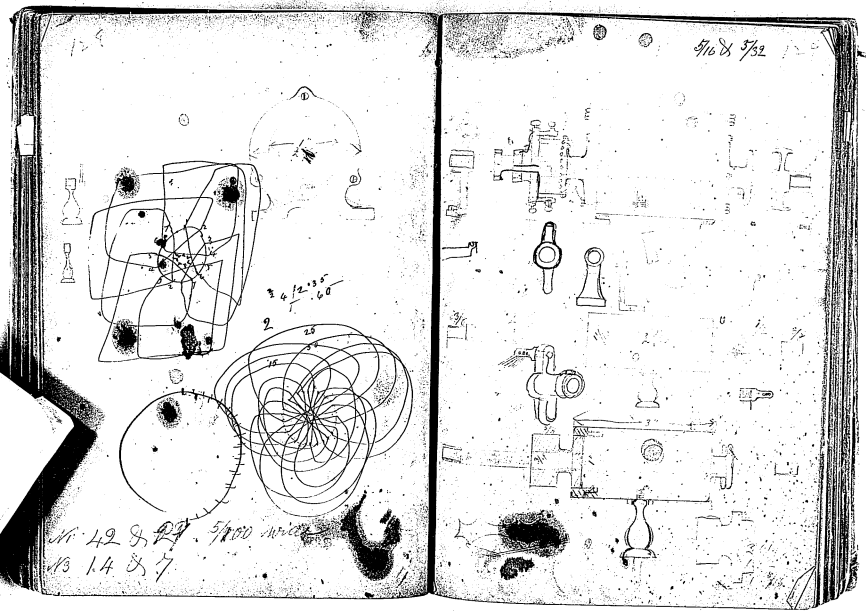







N
12.5
N
S

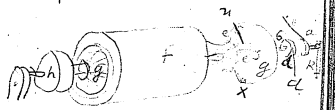



5/16 & 5/32
#4 12-3 5-60
2
#1 42 & 27 5/100 inch
#3 14 & 7

The aGreed on the Conditions to
to governe Wilkins Patent
by the appointment of
The invention Consists 1
1st In the method of winding
and Connecting the wire
the Commutator.
2nd in the method of
the Governor -
3rd The method of operating
the Current by
the Cords of gut and
Causing the them to cut the
wire while standing still

4. The use as a armature to the field magnet consists of a sheet copper ~~tube~~ washer [illegible] separated from the armature

Fig 1



f is the cylinder within which the ~~armature~~ wire brushes are placed. The Cylinder is made up of [illegible]

Number of discs clamped together by three rods. These discs are mounted on Each of them is pasted paper upon their sides. The object of the invention is to prevent the ~~fault~~ current from circulating within the iron ~~This fault~~ I will mention that this invention may be made by cutting away one or the pieces of which will prevent to a greater extent the formation of eddies.

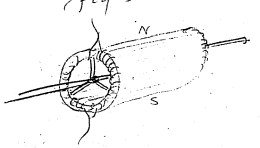
Converts, but is more
Expensive.

fig 2

In fig 2 is shown the
field magnet
which consists of coil
wound on soft iron
closed, when
The core is wound
over its entire
starting from any

points two wound under [illegible]
the Ending wire is [illegible]
with the [illegible]
Here two [illegible]
cotton by inserting wire
[illegible] to two [illegible]
hinge on the shaft
The wires being bent in [illegible]
cut on the shaft = [illegible]
The form of the [illegible] quill cut
in fig 3 may also be used

fig 3

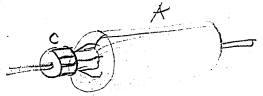


nifigure 3 the fuse consists of a cylinder of iron or iron wire wound in the form of a cylinder, ~~two separate~~ Coils of wire are wound on it, brass arms at each end connect it to the shaft which rotates it =
Two separate coils of wire are wound around the shell passing over the top & bottom, these underneath, these wire coils are wound longitudinally and the two extremities of the coils are connected together as well as the two extremities on the other side — ~~of the~~

~~Current to pa~~

If these ends be connected
to a source of Electric
Energy the ~~p~~ iron shell at
the point where the wires are
connected become respectively
the N. & S. poles of the magnet
Whether either the form of magnet
shown in fig 2 or 3 is
mounted and revolved within
the ~~of the~~ cylinder of discs
it causes to field ~~of~~ without
decreasing the polarity of
the Cylinder of discs
at each revolution.

between the cylinder and the revolving field magnet of figs 2 & 3. is the shell ~~fig~~ A shown in fig. 4.



The shell is made of Vulcanized fibre about 1/16 thick and the ends are either non metallic or if metallic must be of nickalline wire if attention is paid to the prevention of the circulation of any currents

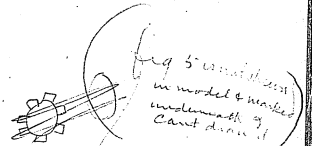
which might be induced 149
into it.

~~The field magnet~~ the wires are wound over the shell (right) and are connected to the blocks (left) of the commutator C in a manner to be hereafter described.

Within this shell the field magnet revolves. The combination forming a compact machine in which the concentration of the field is very great, and the magnetic resistance of the iron of the magnetic circuit very slow

and where every line of force must cut the wire upon the shell K. This utilizing the whole field, which is of the great economy as it requires expenditure of energy, to form the field. and if ~~from a point~~ a ~~point~~ of the lines of force do not cut the wire, then to that extent is energy lost. I will now describe a new and useful method of winding the wire and a coil ~~for~~ the commutator ~~and~~ ~~the~~ ~~winding~~ ~~of the wire~~ ~~and no part of the~~

the loss of energy by short circuiting within the machine reduced to a minimum.



~~Suppose~~ fig refers to fig 5 and consists of the commutator provided to fig resting upon the brackets 1 + 5

and the ~~top~~ field magnet with has its north pole on top & its south pole below

bottom then the current from
the brush resting on block
I would go via wires ~~1 to~~
~~the north pole~~ [illegible]
~~S of 13~~ 14.6, North pole
returning by wires 8 4 13
over south pole. thence
over the north pole by
wires 3 4 ~~12~~ returning
over the south pole
by wires 10 & 11. thence over
the north pole by wires
5, 4, 2. then returning under
the south pole by
9 & 12. the 9 being
* connected to the brush
5 upon which each

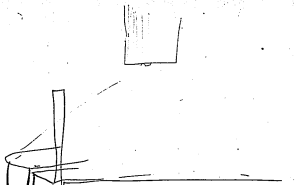
Communicate by such rest
hence with a double wire
circuit. the wire 12
proceeds to Owen the
N with pole by no 7
wire, thence 6 under
7 South [illegible] the
other wire of Communic
6 Clock. 5. This coil
is at the water side pump
station the north
South pole of which
runs a short distance
the ground here is of no
use to short circuit
the Grounds are reversed
to 6 Clock 7.4 6. The
same Commutation or Current

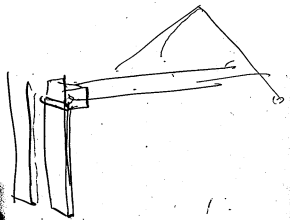
4 formed but by an alternate
set of wires, so that no
matter what the position
of the brushes a complete
circuit is formed cutting
all the lines of force.
The Commutation can only
be attained by employing
an odd number of coils
4 an odd number of
blocks, the method of
the use of an odd number
of blocks
so that the wires may be
in circuit at all
the commutator the
novelty of the part of

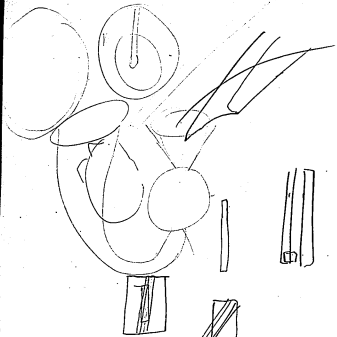
the invention. In fig
5 is shewn another
method of winding with
an even number of coils
but only [illegible]
to illustrate [illegible]
of winding [illegible]
with the form of the
brushes and [illegible]
NO 1. & 4 — wherein
[illegible] is applied to
the wire — then the wire 4
crosses around the [illegible]
[illegible] [illegible]
in the air at
at 10: hence is not used
in the position, but the

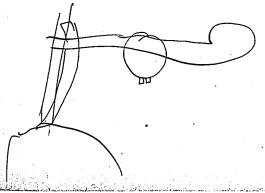
wine 14 passes over the
north pole returns via
wine 6 under the south
pole returned over the
North pole by wine 16,
returning under South
pole by wine 8. Then over
North pole by wine 3.
returning under S pole by
wine 11. When ash is counted
to 6 Cock 4 all the wine
of the wine is not used
if the brushes are at
6 Cock 2, 4, 5. then the
wine 6 over the north pole
passes around the other
3 times ending - 2 turns
at 10 is not used -

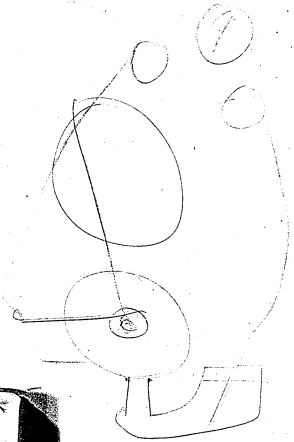
but the wire 16 passes over 15
north pale returning under S
pale by wire 8, thence over N
pale by wire 3, returning
under S pale by wire 11,
thence over N pale by 5
returning under S pale
by 13, which makes Connection
~~to~~ ~~block~~ Connection
to block 5 the wire 7
which connects to the
block also passes twice
around the cylinder 7 & 15
in the same direction
so no matter what
position the brushes may
be when they open or close
See page 173

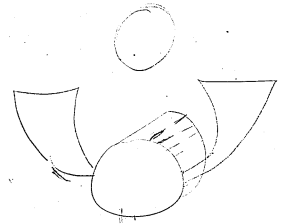






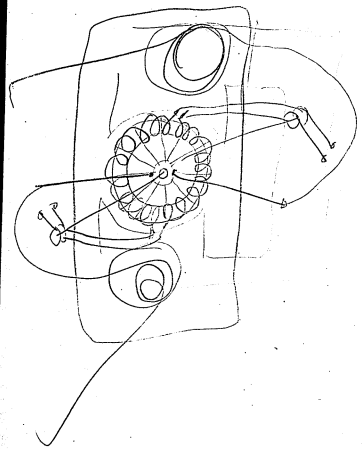






March 1 1879

Chas Blatchley



apart 1/2 of the area is
always considered proper
for reckoning the Circuit within
the a Chain is thrown out a
Circuit. I will mention
than an extra Chain may
be inserted in the middle
& divided in five parts on
part of which the area
not may be Considered of the
other part even no 10 is
this will to some Extent
prevent map errors.

Referring to fig 1

x . n are the Communicating springs secured to a disc q which rotates with the shaft =

b . & . a are insulated Collars. The collar b is connected to the brush n. while the other brush m is connected to one End of the fixed spring within the shell the other End of the fixed spring

is connected to the brush
A by a wire passing through
a groove in the shaft
hence the wire upon the
~~slit~~ interior is connected
in the same manner
with the positive magnet
+ the ~~current~~ resultant
Current is taken from
the machine by the
brushes d. e. resp.
in the coil 6, 4, 6,

I will mention that the field magnet inside stand while the outer shell be made to rotate.

~~In the case of~~ I also show the iron armature core by stepped pulley ring & head rigid & the ~~brass~~ wire wound around this iron shell & the wire connected to the commutator by leads to rotate

In practice it shall
put at fan upon one end
of the shaft to create
a draught of air
through the machine
to carry away any heat
which may be generated
when the machine is made
to exceed its normal
capacity, ~~with~~ it
but this will not be
necessary under ordinary
conditions as the Rudd
Magnet unlike similar
magnets used in this
class of machine

where several Layers
of wire is wound one over
the other & there prevent
dissipation of heat,
has only one Layer of
wire hence all heat is
in Contact with the
air & no loss of heat
in Chest ~~any heat~~ accumulation
of heat is impossible.

Claims

~~The Coil of~~ The Coil
herein described consisting
a cylindrical magnet
e.g. Bundle of iron wires
the Entire Surface being

as described.

2nd The shell shown connected of ~~with~~ an odd number of Coils and connected to an odd number of Commutator portions & Coils all arranged connected & operated Jacobs Coils [illegible] each.

3rd The method of [illegible] the shell as shown & described in ~~Specification~~ Fig 5

4- In Combination with ~~the foregoing~~ a rotating

fuel drawn quite such as described of the shell of fig 4 or 5 and the outer man cylinder for the purposes set forth,

5th = The use of intervening fabric to form the packing upon which the one of the Cominutators is carried

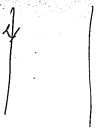
T. A. Edison
Assignor to
Menlo Park, N.J.
1879

Platinum wire made incandescent and a slight pull put on. Streaches 1/4 inch on a 4 inch piece of .005 inch. Under the Microscope innumerable deep cracks are seen =

Platinum .005 wire 4 inches long pulled through the fingers gently for 20 time cold elongates 1/16 of an inch. =

Streaching Cold does not show cracks breaks off [illegible] thin

Copper wire healed red & kept streached. shows these cracks under Microscope. This seems to prove that the phenomena of annealing with consequent pliability is due chiefly to Cracks.



2.6
5.4
60

6 in
3.14
6
12 18.84
1.57

How do you get that now ?

now is the winter

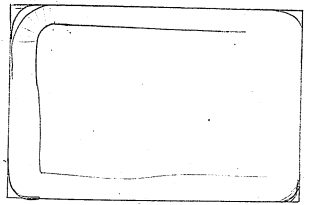
How do you get

I think that I can write very poorly now now is the winter

How do you get that

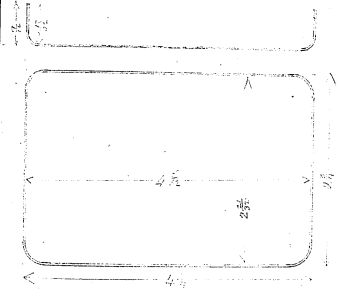
How

Pages 194 to 233. "Telephone Notes & Sketches, largely on Electro-Motograph Receiver." (Unimportant)



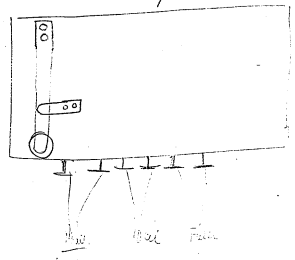
196

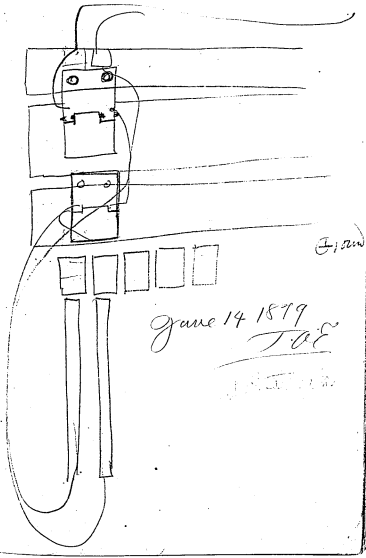
Rubber Mat for Telephone



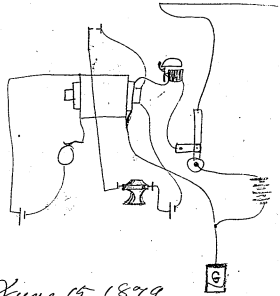
6 layers of No 30 wire on top of induction coil

Take control off arm and flexible lead fitting put on 2 more terminals



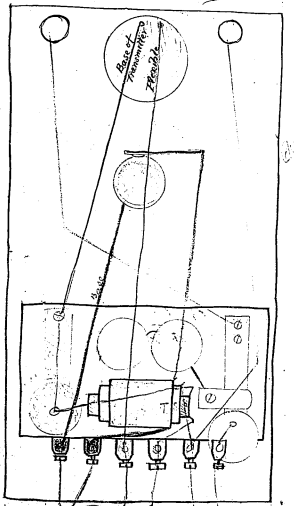


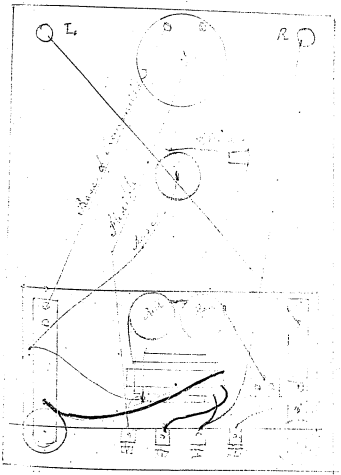
June 14 1879
TAE



June 15 1899
T A E

June 15 1899 T A E

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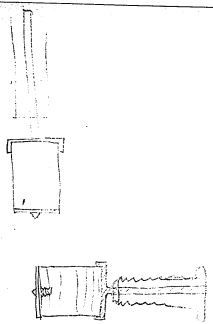
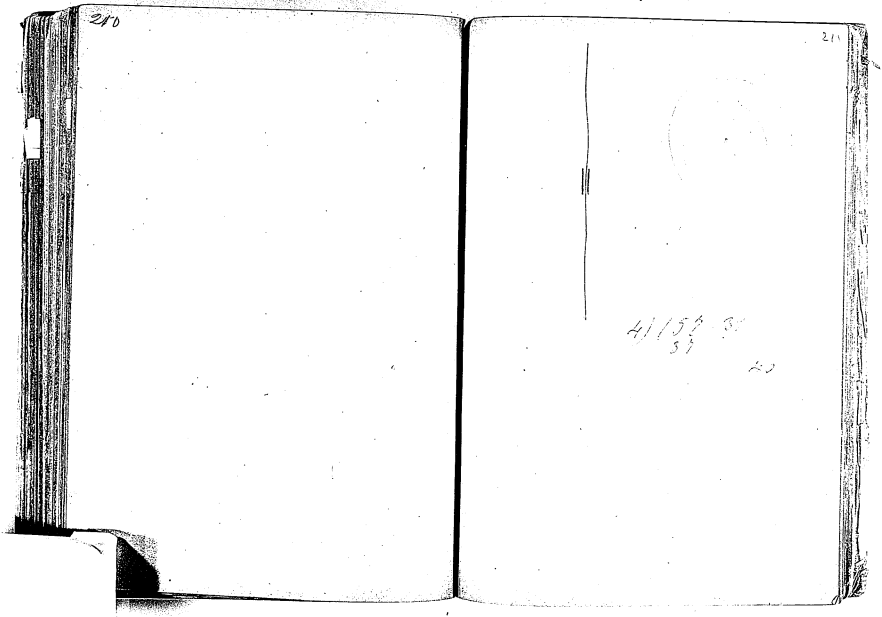
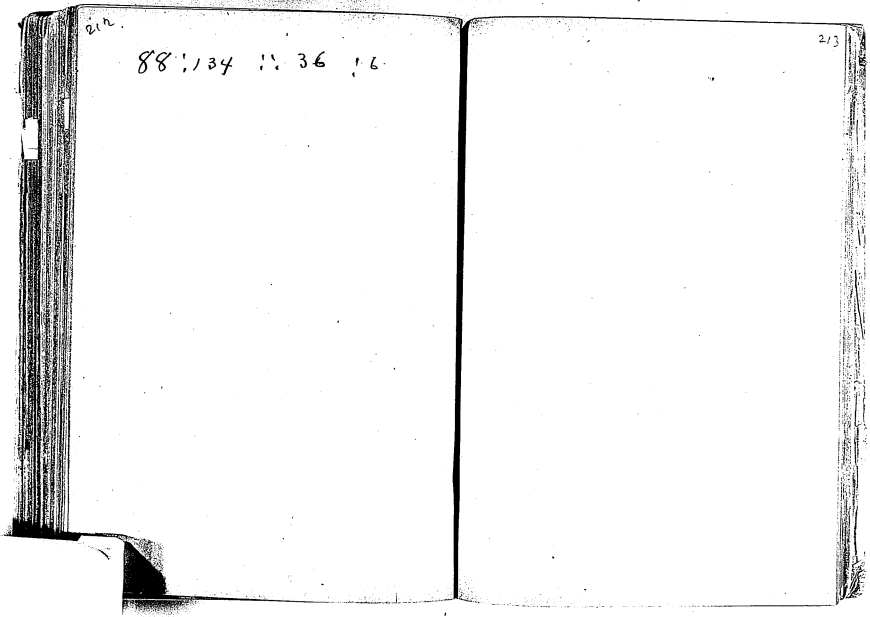
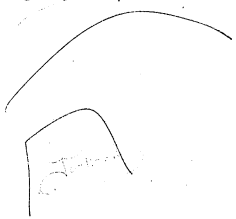


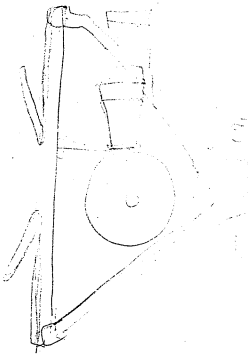



212.
88 ; 134 :: 36 : 16
213

Bourseul's telephone

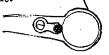
July 4th 1879





Edison Telephone

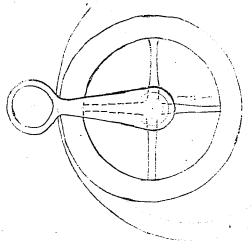
July 4 1879
Chas. A. Tainter

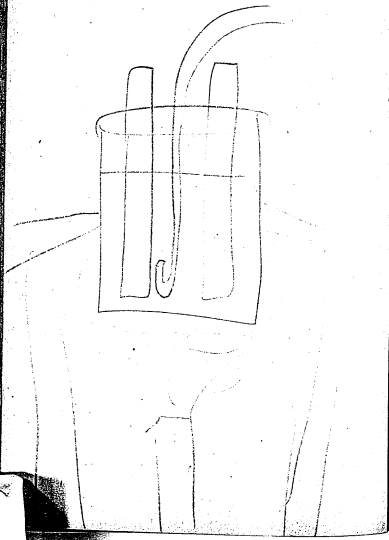


Edisons Telephone

July 4th 1879 221

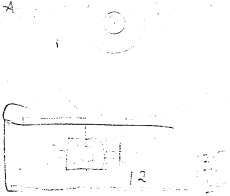
Diagrammatical

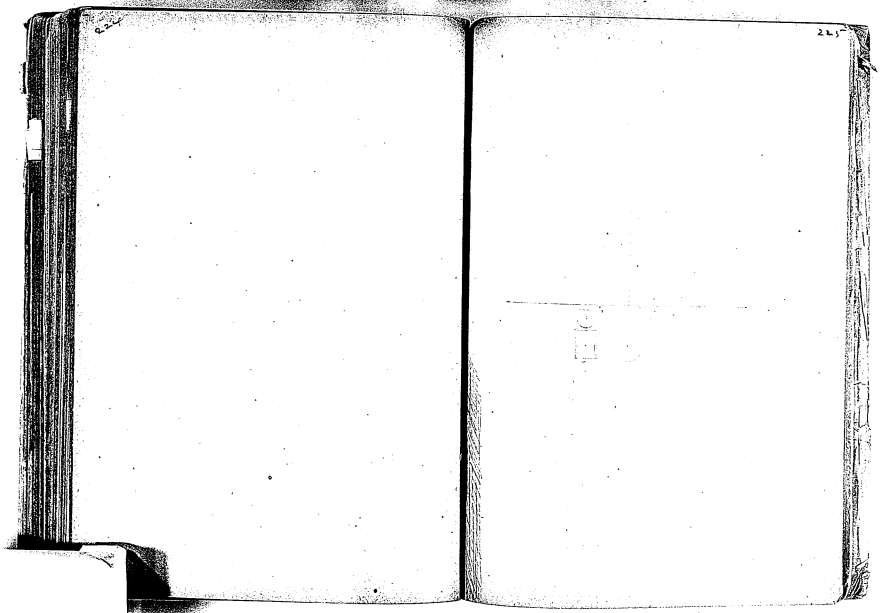


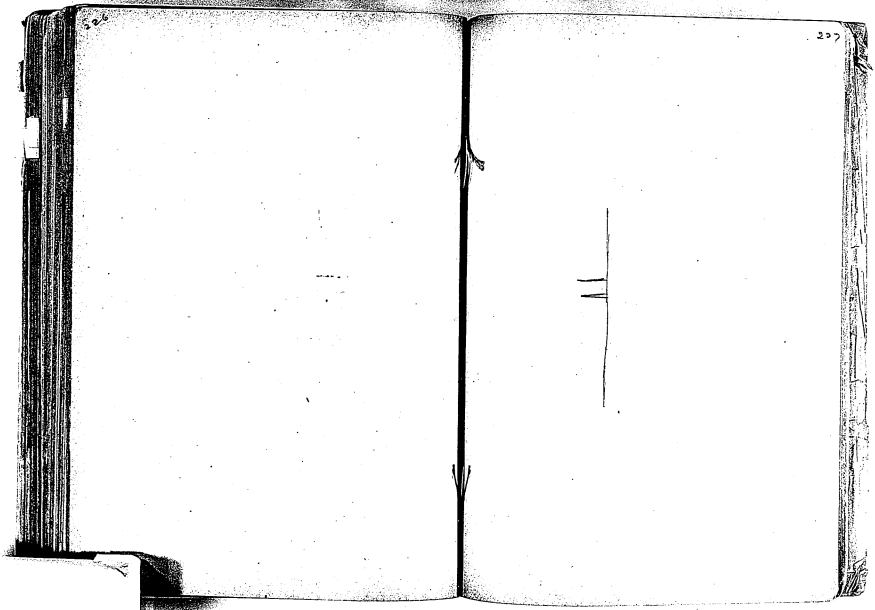


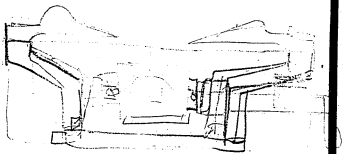
Edisons telephone July 5th 1879 225
Chas Batchelor

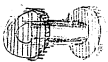
Alter the model made by Mr. myself 7th,
to this

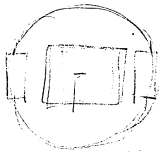






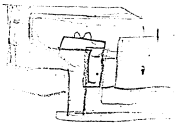




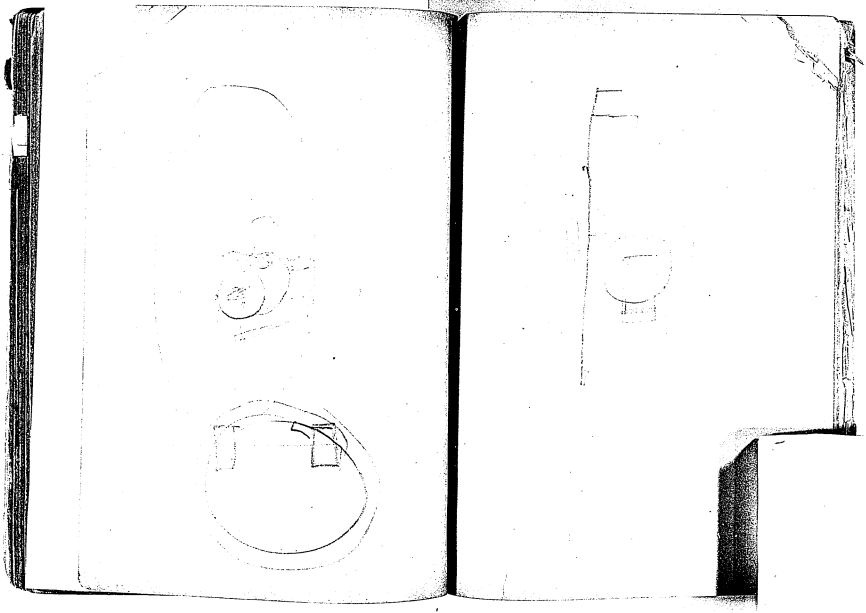


32, 72/7 = 504.

1·19, 50/7 = 35-2



25



$\frac{1}{2}$ $\frac{1}{16}$

.125
.0625

.0625
3
.1875
.125
.19375
1193
.096

$\frac{1}{16}$
$\frac{1}{2}$
$\frac{3}{16}$
.19375

06

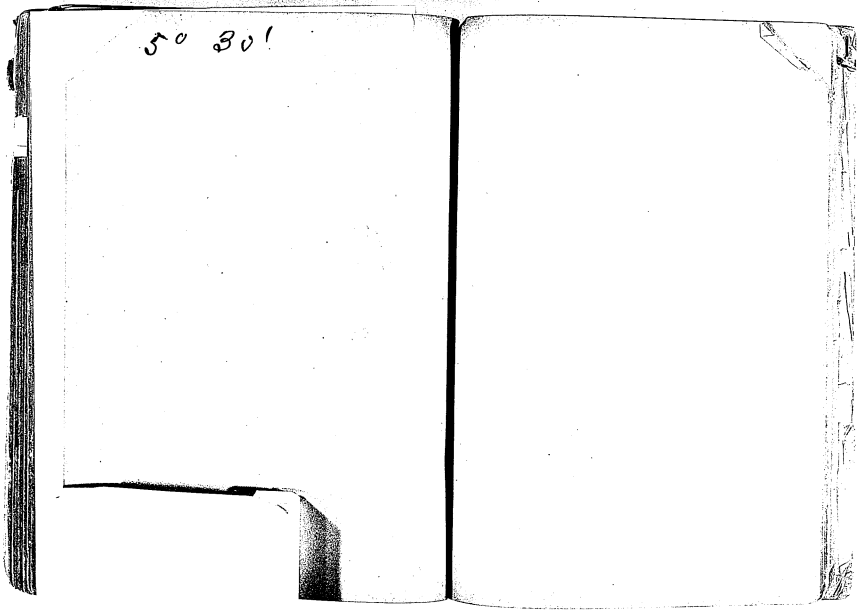
.0625 2.7959
.0625 2.7959
3.14 .4969
.5 1.6990
3.7877

.00613
800
4.90400 cu inches

16
16
96
16

1.223 16 1.2041
16 3
16 3.6123

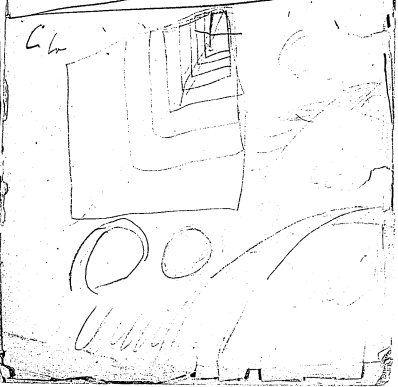
4096


50 301

$C_{total} : C_{branch} :: \frac{1}{2}$

Dec 31 1899

C_{br}



$C_1 : C_1 :: R : \frac{R_1 + R_2}{R_1 R_2}$

$C_y : C_2 :: R_2 : \frac{R_2 + R_3}{R_2 R_3}$

$C_1 = \frac{R_2}{\frac{C_y}{R_2 + R_3}}$

$= \frac{R_2^2 R_3}{R_2 + R_3} \cdot \frac{1}{C_y}$

$C_y = \frac{R_2^2 R_3}{R_2 + R_3} C_1$

Please shrink on scanner
Obstacle left